

REMARKS/ARGUMENTS

Claims 1-18 remain pending in this application. No claims are amended, canceled, or added by this response.

Embodiments in accordance with the present invention relate to methods for manufacturing a mask having an opaque edge structure comprising a carbon bearing material. Accordingly, pending independent claims 1 and 11 recite as follows:

1. A method for manufacturing a mask for integrated circuit devices, the method comprising:

providing a quartz substrate having a surface, the quartz substrate comprising a thickness;

forming a MoSi film overlying the surface of the quartz substrate;

patterning the MoSi film overlying the quartz substrate to form a mask pattern; and

forming an opaque edge structure comprising a carbon bearing material on a portion of the surface around a peripheral region of the mask pattern; whereupon the opaque edge structure has a light transmittance ranging from about 0% to about 3%. (Emphasis added)

* * *

11. A method for processing integrated circuit devices, the method comprising:

providing a mask structure, the mask structure comprising a quartz substrate having a surface, a patterned MoSi film overlying the surface of the quartz substrate to form a mask pattern, and an opaque edge structure comprising a carbon bearing material on a portion of the surface around a peripheral region of the mask pattern; and

using the mask structure for applying a pattern onto a photosensitive material overlying a semiconductor substrate. (Emphasis added)

The Examiner has rejected all of the pending claims as either anticipated under 35 U.S.C. §102 by U.S. Patent No. 5,674,647 to Isoa et al. ("the Isoa Patent"), or obvious under 35 U.S.C. §103, based upon the Isoa Patent taken in combination with other references. These claim rejections are overcome as follows.

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As a threshold matter, the Examiner is respectfully reminded that certain claims stand rejected as anticipated, and not merely obvious, in light of the Isoa Patent:

[t]he distinction between rejections based on 35 U.S.C. 102 and those based on 35 U.S.C. 103 should be kept in mind. Under the former, the claim is anticipated by the reference. No question of obviousness is present. In other words, for anticipation under 35 U.S.C. 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present. (Emphasis added; MPEP 706.02)

Here, the Isoa Patent completely fails to provide any teaching, or even suggestion, regarding all of the elements of the pending claims.

In particular, the Isoa Patent completely fails to provide any disclosure of an "opaque edge structure comprising a carbon bearing material" recited in independent claims 1 and 11. At page 3, lines 11-12 of the latest Office Action mailed April 24, 2006, the Examiner states:

(7); (13) wherein the carbon is in a C12, C13, C14 state (see column 13 lines 25-65)

The specific passage of the Isoa Patent cited by the Examiner is reproduced below:

in the optical constant.

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TABLE 5

case	gas flow ratio %					pressure $\times 10^{-3}$	deposition rate	film	material
	Ar	O ₂	N ₂	NO	CH ₄				
C-1	71.4	28.6	0	0	0	3.0	250	Cr	
C-2	92.2	7.7	0	0	0	3.9	450	oxide	
C-3	90.0	10.0	0	0	0	3.0	500	film	
C-4	85.0	15.0	0	0	0	2.0	541		
C-5	85.5	14.5	0	0	0	0.1	794		
C-6	89.3	10.7	0	0	0	8.0	428		
C-7	92.7	7.3	0	0	0	4.0	758		
C-8	96.6	3.4	0	0	0	4.0	443		
C-9	94.8	5.2	0	0	0	8.1	733		
C-10	93.1	6.9	0	0	0	6.1	791		
C-11	93.2	6.8	0	0	0	4.0	824		
C-12	90.1	9.9	0	0	0	4.1	787		
C-13	95.1	4.9	0	0	0	8.2	659		

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TABLE 5'

case	gas flow ratio %					pressure $\times 10^{-3}$	deposition rate	film	material
	Ar	O ₂	N ₂	NO	CH ₄				
C-14	54.1	32.4	13.5	0	0	1.5	110	Cr	
C-15	43.8	39.0	12.2	0	0	1.5	108	oxide	
C-16	87.8	6.4	6.4	0	0	4.1	292	oxide	
C-17	82.9	4.9	12.2	0	0	4.2	323	film	
C-18	90.0	1.3	8.7	0	0	4.1	356		
C-19	76.0	0	0	24.0	0	2.0	600		
C-20	83.0	0	0	17.0	0	3.2	620		
C-21	75.5	0	0	24.5	0	2.3	570		
C-22	86.0	0	0	14.0	0	4.2	350		
C-23	85.5	0	0	13.5	0	4.1	380		
C-24	82.4	0	0	17.6	0	3.2	520		
C-25	86.2	0	0	13.8	0	4.2	620		
C-26	87.1	0	0	12.9	0	4.1	673		
C-27	83.2	3.3	0	0	9.3	4.0	471	Cr	
C-28	82.9	7.9	0	0	9.1	3.0	513	carbide	
C-29	78.3	13.0	0	0	8.7	2.0	642	oxide	
C-30	87.9	2.3	0	0	9.3	8.1	359	oxide	

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Careful review of these tables, or indeed all other portions of the Isoa Patent, signally fails to reveal any teaching whatsoever regarding use of carbon in a mask, never mind formation of the claimed "opaque edge structure comprising a carbon bearing material". The "C12", "C13", and "C14" designations present in the TABLE 5 and TABLE 5' reproduced above, refer only to particular "cases" or examples provided by the Isoa Patent. These example "cases", which number up to "C30", are referenced throughout the Isoa Patent in other Figures and TABLES. There is absolutely no teaching here regarding the formation of structures from carbon-bearing materials, in the C₁₂, C₁₃, or C₁₄ any other isotope state.

In view of the complete failure of the Isoa Patent relied upon by the Examiner to teach all of the elements of the pending claims, it is respectfully asserted that the anticipation claim rejections have successfully been overcome. Continued maintenance of these anticipation claim rejections is improper, and the rejections should be withdrawn.

Regarding the obviousness claim rejections, the Examiner is respectfully reminded that a first requirement to establish a prima facie case of obviousness is that "the prior art reference (or references when combined) must teach or suggest all of the claim limitations." (MPEP 2143).

Again, the Isoa Patent is the primary reference relied upon by the Examiner to assert obviousness of the pending claims. As discussed above, the Isoa Patent fails to provide any teaching, or even suggestion, regarding the claimed opaque edge structure comprising a carbon bearing material.

Consideration of either of the additional references being relied upon by the Examiner, does nothing to provide this absent teaching. For example, as openly conceded by the Examiner in the previous office action (mailed October 4, 2005, at page 4), published U.S. patent application document 2004/008678 to Shiota et al. lacks any teaching or suggestion to form a carbon-bearing opaque edge structure.

As for U.S. Patent No. 5,474,864 also to Isoa et al, this reference describes only the repair of various types of defects that may be present in a mask. It says nothing to teach or suggest formation of the claimed carbon-bearing opaque edge structure.

In view of this additional failure by the combined references relied upon by the Examiner to teach or suggest each and every element of the pending claims, it is respectfully asserted that

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the claims cannot be considered obvious in view of those references. Continued maintenance of the obviousness claim rejections is improper, and these claim rejections should be withdrawn.

Based upon the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested. If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Kent J. Tobin', with a horizontal line extending to the right.

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